National Institute of Environmental Health Sciences

Separating the effects of climate change and human activities on runoff over different time scales in the Zhang River basin

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Abstract:

Most studies on separating the effects of climate change and human activities on runoff are mainly conducted at an annual scale with few analyses over different time scales, which is especially essential for regional water resources management. This paper investigates the impacts of climate change and human activities on runoff changes at annual, seasonal and monthly time scales in the Zhang River basin in North China. Firstly, the changing trends and inflection point are analyzed for hydro-climatic series over different time scales. Then the hydrological modeling based method and sensitivity based method are used to separate the effects. The results show that the effect of climate change is stronger than that of human activities on annual runoff changes. However, the driving factors on runoff are different at seasonal scale. In the wet season, the effect of human activities on runoff, accounting for 57 %, is stronger than that of climate change, while in the dry season climate change is the dominant factor for runoff reduction and the contribution rate is 72 %. Furthermore, the effects of climate change and human activities on monthly runoff changes are various in different months. The separated effects over different time scales in this study may provide more scientific basis for the water resources adaptive management over different time scales in this basin.

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Resource Description

Communication: ☑

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Other Communication Audience: Water resource managers

Exposure : ☑

weather or climate related pathway by which climate change affects health

Food/Water Security

Geographic Feature: ☑

resource focuses on specific type of geography

Freshwater

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: China

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content